

ABSTRACT OF THE DISCLOSURE

Rinsing or sealing solutions based on cobalt are described for barrier films such as anodic coatings, phosphate coatings, or “black oxide” coatings. The treated films contain a trivalent or tetravalent cobalt/valence stabilizer complex. The rinsing or sealing bath may also contain an optional preparative agent or an optional solubility control agent. The oxidized cobalt is present in the coating in a “sparingly soluble” form. The valence stabilizers can be either inorganic or organic in nature. Cobalt/valence stabilizer combinations are chosen based on the well-founded principles of cobalt coordination chemistry. A number of cobalt/valence stabilizer combinations that match the performance of conventional hexavalent chromium systems are presented.